9

16. A modified human hemoglobin comprising:

a mutant human α-globin polypeptide comprising the amino acid sequence of normal human α-globin modified by the substitution of Cys at position 104 by a non-Cys amino acid;

a mutant human β-globin polypeptide comprising the amino acid sequence of normal human β-globin modified by the substitution of Cys at positions 93 and 112 by non-Cys amino acids; and

said modified hemoglobin further characterized by the substitution of Cys for the native sequence amino acid at one of the following positions:

β-globin position 9;

β-globin position 17;

β-globin position 80;

α-globin position 71; or

α-globin position 53.

10

17. A polymeric hemoglobin comprising a modified human hemoglobin according to claim ~~16~~ 5, 11, 12, ~~13~~ 6 or ~~16~~ 9, wherein adjacent hemoglobins are covalently bonded to each other by one or more disulfide bridges formed by cysteine amino acid residues.

11 10

18. A polymeric hemoglobin according to claim ~~17~~ wherein the modified hemoglobin is characterized by the substitution of Cys for the native sequence amino acid at β-globin position 9, said polymeric hemoglobin comprising seven modified hemoglobins.

12

19. A blood substitute comprising a polymeric hemoglobin according to claim ~~17~~ 10.

13

20. A blood substitute comprising a polymeric hemoglobin according to claim ~~18~~ 11.